

CLAIMS

[1] A low-carbon resulfurized free machining steel product excellent in finished surface roughness, comprising, on the percent by mass basis, C: 0.02% to 0.12%, Si: 0.01% or less, Mn: 1.0% to 2.0%, P: 0.05% to 0.20%, S: 0.30% to 0.60%, N: 0.007% to 0.03%, with the balance being Fe and inevitable impurities, the contents of Mn and S satisfying the following conditions: $0.40 \leq \text{Mn} \cdot \text{S} \leq 1.2$ and $\text{Mn}/\text{S} \geq 3.0$, and the steel product having a ferrite-pearlite structure as its metallographic structure, wherein the average width (μm) of sulfide inclusions in the steel product is $2.8 \cdot (\log d)$ or more, wherein d is the diameter (mm) of the steel product, and pro-eutectoid ferrite in the metallographic structure has a hardness HV of 133 to 150.

[2] A low-carbon resulfurized free machining steel product excellent in finished surface roughness comprising, on the percent by mass basis, C: 0.02% to 0.12%, Si: 0.01% or less, Mn: 1.0% to 2.0%, P: 0.05% to 0.20%, S: 0.30% to 0.60%, N: 0.007% to 0.03%, with the balance being Fe and inevitable impurities, the contents of Mn and S satisfying the following conditions: $0.40 \leq \text{Mn} \cdot \text{S} \leq 1.2$ and $\text{Mn}/\text{S} \geq 3.0$, and the steel product having a ferrite-pearlite structure as its metallographic structure, wherein the average width (μm) of sulfide inclusions in the steel product is $2.8 \cdot (\log d)$ or more, wherein d is the diameter (mm) of the steel product, and a difference in deformation resistance at a strain of 0.3 between 200°C and 25°C is 110 MPa or more

and 200 MPa or less, the deformation resistances being determined at a deformation rate of 0.3 mm/min in a compression test.

- [3] The low-carbon resulfurized free machining steel product excellent in finished surface roughness according to one of Claims 1 and 2, wherein the steel product contains 70 ppm or more of dissolved nitrogen.
- [4] The low-carbon resulfurized free machining steel product excellent in finished surface roughness according to any one of Claims 1 to 3, wherein the Cr content is not more than 0.04%, and the total content of Ti, Nb, V, Al and Zr is not more than 0.020%.
- [5] The low-carbon resulfurized free machining steel product excellent in finished surface roughness according to any one of Claims 1 to 4, further comprising one or both of Cu: more than 0.30% and equal to or less than 1.0% and Ni: more than 0.20% and equal to or less than 1.0%.
- [6] A method for producing a low-carbon resulfurized free machining steel product excellent in finished surface roughness, comprising the steps of casting a steel having the composition as defined in any one of Claims 1 to 5, and controlling, before the step of casting, free oxygen (Of) to a content of 30 ppm or more and less than 100 ppm and the ratio Of/S of Of to S to within a range from 0.005 to 0.030, Of and S being contained in molten steel before casting.